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EXAMINER

SWERDLOW, DANIEL

ART UNIT PAPER NUMBER

2646

DATE MAILED: 02/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/644,141

Applicant(s)

THIRUMOORTHY, HARI

Examiner

Daniel Swerdlow

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 and 28-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 and 28-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 September 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings were received on 22 September 2005. These drawings are acceptable.

Specification

2. Applicant's amendment of 22 September 2005 overcomes the objections to the specification made in the prior Office action.

Claim Rejections - 35 USC § 112

3. Applicant's amendment of 22 September 2005 overcomes the claim rejections under 35 USC § 112 made in the prior Office action.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1 through 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Sih (US Patent 5,559,881).
6. Regarding Claim 1, Sih discloses a method for canceling echo (i.e., signal modification) comprising: receiving a far-end speech (i.e., input) signal (Fig. 5, reference x(n); column 9, lines 14-16) at the input of an echo canceller filter (Fig. 5, reference 156, 158, 160); attenuating input

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samples (i.e., scaling a binary range associated with filter taps) (column 17, lines 21-32) relative to a preset value near the top of the range (i.e., to a value of a high amplitude portion of the input signal); storing the scaled input values in the filter taps (i.e., in association with one of the taps) (Fig. 4, reference 120; column 7, lines 3-10) and multiplying (i.e., modifying) the input signal sample values (i.e., input signal) by coefficients (i.e., amounts) associated with the input signal sample values (i.e., stored portion of the input signal) (Fig. 4, reference 120, 122, h; column 7, lines 3-10).

7. Regarding Claim 2, Sih further discloses the received signal is a voice (i.e., analog) signal (column 4, lines 48-49).

8. Regarding Claim 3, Sih further discloses a finite impulse response filter (Fig. 4).

9. Regarding Claim 4, Sih further discloses a tapped delay line (Fig. 4, reference 120) that stores amplitudes of all portions of the input signal.

10. Regarding Claim 5, Sih further discloses that the far end speech signal that corresponds to the input signal claimed produces (i.e., is a component of) the echo signal (column 6, lines 4-10).

11. Regarding Claim 6, Sih further discloses outputting an echo replica signal (i.e., modified input signal) from the filter (Fig. 5, reference $y^{(n)}$; column 10, lines 1-4).

12. Regarding Claim 7, Sih further discloses attenuating input samples (i.e., scaling a binary range associated with filter taps) (column 17, lines 21-32) relative to a preset value near the top of the range (i.e., under which a desired portion of actually measured input values falls).

13. Regarding Claim 8, Sih further discloses a range of values between -8031 and +8031 that can inherently be represented by a plurality of bits (column 17, lines 21-26).

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14. Regarding Claim 9, Sih further discloses attenuating input samples by 1.5 dB (i.e., the binary range is scaled proportionately) (column 17, lines 26-32).

15. Regarding Claim 10, Sih further discloses a range of values between -8031 and +8031 that are inherently represented by the negative of the absolute value of the high amplitude and the positive of the absolute value of the high amplitude (column 17, lines 21-26).

16. Regarding Claim 11, Sih further discloses a range of values between -8031 and +8031 being the range provided by the vocoder. As such, the largest negative value binary value is the largest negative value those bits from that vocoder can represent and the largest positive is the largest positive value those bits from that vocoder can represent (column 17, lines 21-26).

17. Regarding Claim 12, Sih further discloses the high value being a value at the top of the range (i.e., the largest of a plurality of measured amplitudes) (column 17, lines 21-26).

18. Regarding Claim 13, Sih further discloses the high value being a value at the top of the range (i.e., a function of a sampling of a plurality of measured amplitudes) (column 17, lines 21-26).

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. Claims 14 through 25 and 28 through 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu (US Patent 6,768,796) in view of Kawata et al (US Patent 5,029,121).

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21. Regarding Claim 14, Lu discloses a finite impulse response adaptive filter echo canceller (Fig. 8; column 8, lines 50-57) in which a sequence of coefficients (i.e., $h_0(n)$ through $h_{L-1}(n)$) represent the impulse response of the echo-causing system (i.e., echo amplitude). Kawata discloses a finite impulse response filter (Fig. 1; column 1, lines 19-49) in which tap weights (i.e., values associated with a tap) are scaled by: determining a storage capacity of a coefficient register (i.e., a range of values that may be held in binary in association with the tap) (column 5, lines 61-64); determining the location of the highest order effective bit in a coefficient (i.e., a range within which a normal echo amplitude of an audio signal falls) (Fig. 3b; column 6, lines 6-7); and shifting the bits in the coefficient to store only the highest order effective bit and less significant bits (i.e., scaling the range of values that may be held in binary in association with the tap to the range within which normal echo amplitude falls). Kawata further discloses that such an arrangement improves precision and prevents error (column 3, lines 65-68). It would have been obvious to one skilled in the art at the time of the invention to apply coefficient scaling as taught by Kawata to the echo canceller taught by Lu for the purpose of realizing the aforesaid advantages.

22. Regarding Claim 15, Lu further discloses determining the coefficients (i.e., measuring echo amplitude) using the filter (column 6, lines 10-20). Kawata further discloses shifting the bits in the coefficient to store only the highest order effective bit and less significant bits (i.e., storing a value corresponding to the measured amplitude in association with the filter tap based on the scale).

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23. Regarding Claim 16, Lu further discloses subtracting summed filter tap products from an audio signal ($r(n)$) (i.e., reducing the audio signal by the amplitude associated with the filter tap) (Fig. 8, reference 460; column 6, lines 26-33).

24. All elements of Claims 17 through 22 are comprehended by Claims 14 through 16. As such, Claims 17 through 22 are rejected on the same grounds as Claims 14 through 16.

25. Regarding Claim 23, Lu discloses an Internet Telephony Gateway (Fig. 5, reference 302A; column 7, lines 25-48) that corresponds to the voice over internet protocol communication device claimed and performs a digitization, compression and packetization process (i.e., comprises an analog to digital converter and a digital audio transmitter coupled to the analog to digital converter) and reverses the digitization, compression and packetization process (i.e., comprises a digital audio receiver and a digital to analog decoder coupled to the digital audio receiver) (column 7, lines 38-42 and 58-60). Lu further discloses a finite impulse response adaptive filter echo canceller (Fig. 8; column 8, lines 50-57) in which a sequence of coefficients (i.e., $h_0(n)$ through $h_{L-1}(n)$) represent the impulse response of the echo-causing system (i.e., echo amplitude). Lu further discloses subtracting summed filter tap products from an audio signal ($r(n)$) (i.e., having an output to transmit a second signal equivalent to the first signal reduced by the second amplitude) (Fig. 8, reference 460; column 6, lines 26-33). Kawata discloses a finite impulse response filter (Fig. 1; column 1, lines 19-49) in which tap weights are scaled by: determining a storage capacity of a coefficient register (column 5, lines 61-64); determining the location of the highest order effective bit in a coefficient (Fig. 3b; column 6, lines 6-7); and shifting the bits in the coefficient to store only the highest order effective bit and less significant bits (i.e., scaling the range of values to a high amplitude incident on the first signal and storing a

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second amplitude in accordance with the scale). Kawata further discloses that such an arrangement improves precision and prevents error (column 3, lines 65-68). It would have been obvious to one skilled in the art at the time of the invention to apply coefficient scaling as taught by Kawata to the echo canceller taught by Lu for the purpose of realizing the aforesaid advantages.

26. Regarding Claims 24 and 25, Lu further discloses the gateway connected to analog telephone lines (column 7, lines 32-36) (i.e., converts digital audio to analog audio and analog audio to digital audio).

27. Claims 28 through 30 are essentially similar to Claims 14 through 16 and are rejected on the same grounds.

Response to Arguments

28. Applicant's arguments filed 22 September 2005 have been fully considered but they are not persuasive.

29. In the fourth paragraph on page 13 of the response filed on 22 September 2005, applicant alleges that Sih fails to disclose “scaling ... to a value of a high amplitude portion’ of a received input signal” as claimed in Claim 1. Examiner respectfully disagrees. Sih discloses attenuating input samples relative to a preset value near the top of the range (column 17, lines 21-32). The attenuation of the input samples constitutes scaling a binary range associated with filter taps. The fact that this is done relative to a preset value near the top of the range means that the scaling is done to a value of a high amplitude portion of the input signal.

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30. In the third paragraph on page 14 of the response, applicant alleges that Kawata fails to disclose determining a range within which a normal echo amplitude portion of an audio signal falls as claimed in Claim 14. Examiner respectfully disagrees. Kawata discloses determining the location of the highest order effective bit in a coefficient (Fig. 3b; column 6, lines 6-7). Because the tap coefficients are convolved with the reference signal to form an echo replica which constitutes a normal echo amplitude of an audio signal, determining the location of the highest order effective bit in the coefficient determines a range within which a normal echo amplitude of an audio signal falls.

31. In the fourth paragraph on page 14 of the response, applicant alleges that the motivation cited for combining Kawata and Lu “falls far short of a *prima facie* case of obviousness”. Examiner respectfully disagrees. Kawata further discloses that coefficient scaling improves precision and prevents error (column 3, lines 65-68). This is strong motivation since precision and prevention of error are well known goals in the related art. In the first complete paragraph on page 15 of the response applicant alleges that “the Examiner has simply recognized a benefit provided by the present invention, and then used that benefit as a motivation to combine the references”. Examiner respectfully disagrees. Kawata discloses, “This feature improves the precision of the multiplication using the coefficient data. That is, it minimizes the adverse effect by the error due to the quantization of the coefficient data”. As such, the motivation to combine is found in the reference.

Conclusion

32. Applicant's amendment necessitated any new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel Swerdlow whose telephone number is 571-272-7531. The examiner can normally be reached on Monday through Friday between 7:30 AM and 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh H. Tran can be reached on 571-272-7564. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Daniel Swerdlow
Examiner
Art Unit 2646

ds

15 November 2005